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Characteristics of Scaled Quail Loafing Coverts in Northwest Texas[1]

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Cholla cactus (*Opuntia imbricata*) provided cover in 85% of scaled quail (*Callipepla squamata*) loafing coverts during winter and spring. All coverts had a band of lateral cover within the canopy of the overhead shrub. Two to five paths through the lateral cover led to a central, vegetation-free area.

Keywords: *Callipepla squamata*, *Opuntia imbricata*, *Salsola kali*, wildlife habitat.

Management Implications

Active scaled quail loafing coverts should be protected from brush control measures to ensure continued year-round quail use of large treated areas. Existing shrubs, under which vegetation has been grazed short, may make attractive loafing coverts by placing brush around approximately 70% of their periphery and eliminating herbaceous vegetation underneath the central area of the canopy. Planting scattered clumps of cholla could benefit scaled quail on areas devoid of suitable winter loafing coverts. As an alternative, artificial loafing coverts can be designed to include overhead cover, lateral cover, and a central, vegetation-free area.

[1]*Acknowledgment is made to Jay Taylor, owner of the Rafter O Ranch, who provided the study area for this research. The cooperation of Lee Roy McCracken, Rafter O Ranch Manager, is greatly appreciated. John Graves, District Conservationist, Soil Conservation Service, was helpful in the location of the study area and providing maps that were essential for the conduct of this research.*

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Introduction

A loafing covert is a unit of cover used for daytime resting and protection. In Colorado, scaled quail (*Callipepla squamata*) winter use of areas depends on suitable loafing coverts (Snyder 1967). Because cover protects animals from predators and weather conditions (Thomas 1979), survival is related to the quality of loafing coverts. Compared to most other southwestern quail species, scaled quail population levels during drought seem to depend more on survival than on reduced breeding success (Brown 1978, Brown et al. 1978).

This note describes the floristic and structural features of loafing coverts in northwest Texas.

Study Area and Methods

The study was conducted in Oldham County, about 35 miles (56 km) east of the New Mexico-Texas border, along the southern escarpment of the Canadian River. The area is characterized by steep canyons that break out onto a relatively gently sloping broad plain to the north. There are a large variety of woody species associations. Woody species include yucca (*Yucca angustifolia*), sandsage (*Artemisia filifolia*), honey mesquite (*Prosopis*

glandulosa), fragrant sumac (*Rhus aromatica*),mountain-mahogany (*Cercocarpus montanus*), cholla cactus (*Opuntia imbricata*), and one-seeded juniper (*Juniperus monosperma*).

Data were collected from mid-January to early May, 1980. In the Texas Panhandle, this period is characterized by a reduction in cover that is frequently aggravated by cattle grazing and periodic drought. Snow, low temperatures, and high winds during winter increase scaled quail's need for protective cover.

Data were collected on 73 loafing coverts. Coverts were found by locating radio-tagged birds and by searching the various vegetation types in a 1,500-acre (607-ha) area. A unit of cover was considered a loafing covert if it had an accumulation of quail fecal droppings under overhead woody cover and one or more well-worn paths into the cover. There is also an accumulation of fecal droppings at night roosts, but observation of radio-tagged birds showed that they roost in spots without overhead cover. In several cases, coverts were located when birds flushed from under them.

Vegetation types with coverts were characterized by their woody species, without regard to order of dominance. However, at each covert location, note was made of the woody species that was dominant in horizontal coverage. Woody species that made up the overhead cover and surrounding lateral screening cover of each covert were recorded. Lateral cover was further delineated by the presence of dead Russian thistle (*Salsola kali*), standing grass, and forbs, and estimates of the percentage of the periphery of the covert surrounded by lateral cover. The number and directional orientation of well-used openings or paths through the lateral cover also were noted. Beginning in February, the diameter and height of the overhead cover were recorded. Type of substrate (bare ground and litter) under the overhead cover was recorded at 39 coverts examined in March and April. These data may or may not be representative of all coverts examined between mid January and early May. Confidence intervals for means are given at the 95% level of probability.

Results and Discussion

Coverts were found in 11 vegetation types. More than 75% were in yucca, yucca-cholla, mesquite-yucca-cholla, and mesquite-yucca-cholla-sandsage associations (table 1). The mesquite-yucca-cholla and mesquite-yucca-cholla-sandsage associations accounted for nearly half of the locations. Yucca was present in 96%, mesquite in 56%, and cholla in 79% of the associations.

In a concurrent study, observations of radio-tagged birds during the winter and spring confirm high use of vegetation with cholla present. In New Mexico and Colorado, there also is a close association of scaled quail with cholla (Campbell 1952, Hoffman 1965). In addition, the geographic distribution of Arizona scaled quail (*C. s. pallida*) (Aldrich and Duvall 1955), or *C. s. pallida* and *C. s. hargravei* as defined by Rea (1973), closely parallels that of cholla (Benson 1969, Weniger 1969, Frazer and Pieper 1972).

All coverts examined had the following four common features: (1) overhead woody cover; (2) lateral screening cover; (3) a central area with bare soil and no herbaceous vegetation; and (4) one or more paths through the lateral cover into the center of the covert.

Overhead Cover

Height of 41 coverts varied from 1.6 to 5.9 feet (0.5 to 1.8 m); diameters of 39 coverts ranged from 2.6 to 6.9 feet (0.8 to 2.1 m). The mean height was 4.6 ± 1.0 feet (1.4 ± 0.3 m), and the average diameter was 3.9 ± 0.3 feet (1.2 ± 0.1 m).

Cholla formed all or part of the overhead cover of 85% of the coverts (table 1, fig. 1); yet, it was the dominant woody species at only 12 (16%) of the locations. Selection for cholla seemed apparent where it was a less abundant associate of mesquite and yucca. Cholla formed all or part of the overhead cover of 25 of 27 coverts at locations where mesquite was the dominant woody species, and of

Table 1.—Types of overhead cover and vegetation associations for scaled quail loafing coverts found during January-May 1980

Vegetation association [1]	Overhead cover											
	M, Rt	M,C, Rt	M	Man-made	DC,Rt	C, S	Fs	C, M	C, Rt	C	Total	Percent
M Y C	1		1					4	4	9	19	26.0
M Y C S			1					4	3	9	17	23.3
Y C						2	1		2	8	13	17.8
Y				1	3		1	1	1	1	8	11.0
Y S C						2				2	4	5.5
Y M		1							1	1	3	4.1
Y S				2			1				3	4.1
M C										2	2	2.7
Y Fs Mm C							2				2	2.7
Y J Mm C										1	1	1.4
G					1						1	1.4
Total	1	1	2	3	4	4	5	9	11	33	73	
Percent	1.4	1.4	2.7	4.1	5.5	5.5	6.8	12.3	15.1	45.2		100.0

[1] *C = cholla cactus; DC = dead cholla cactus; Fs = fragrant sumac; G = grass; J = one-seeded juniper; M = honey mesquite; Mm = mountain-mahogany; Rt = Russian thistle blown into the covert; S = sandsage; Y = yucca.*

21 or 23 coverts at locations where yucca dominated the woody cover.

In the grass and yucca vegetation types (table 1), most of the cholla and mesquite had been eliminated by brush control measures, in which case quail made use of dead and scattered live cholla for coverts. Artificial structures also provided overhead cover in areas having little or no cholla present.

Mesquite formed all or part of the overhead cover of 13 coverts but only in 3 cases without an associated cholla. Fragrant sumac was used also, even at locations where cholla was present in the woody plant association (table 1). In Oklahoma, Schemnitz (1961) reported that cholla, fragrant sumac, and artificial structures were used as covey resting areas during winter.

Good populations of scaled quail occur in many ranges devoid of cholla. In these cases, other woody species assume importance in providing overhead cover for resting coverts. Wolfberry (*Lycium* spp.) and mesquite (*P. juliflora*) were used for loafing cover in Arizona (Goodwin and Hungerford 1977), and mesquite clumps were used as loafing sites in southeastern New Mexico (Banks 1970). Other woody cover also may be important where the growth form of existing cholla does not provide necessary structural features for resting coverts.

Lateral Cover

The presence of lateral screening cover seemed essential for use of a site. Shrubs without lateral cover were not used (fig. 2). Lateral cover consisted of a band of relatively tall vegetation lying largely within the peripheral canopy of the overhead cover (fig. 1). This area usually is protected from grazing by the low branches of the central shrub. The percentage of the peripheries of the coverts screened varied from 30% to 100%, with an average of 70% ± 4%. In 13 coverts examined in February, the minimum heights of the lateral cover varied from 0.7 to 2 feet (0.2 to 0.6 m). Maximum heights ranged from 1 to 3 feet (0.3 to 0.9 m).

Figure 1. — Loafing covert used by scaled quail during January showing overhead cholla cover and lateral cover of grass and Russian thistle.

Figure 2. — Cholla without lateral cover of grass and Russian thistle in the periphery of the crown. High-crowned shrubs without lateral cover were not used by scaled quail for resting coverts from January to early May.

Two or more different kinds of cover usually provided the lateral screening. Russian thistle that had been blown into the coverts most frequently was the form of cover, but grass also was important (table 2). These two types of cover occurred together in 64% of the coverts. With the exception of Russian thistle, forbs were not important. In some cases, primarily with cholla and yucca, the canopy of the overhead cover and/or adjacent shrubs formed part of the lateral screen.

Table 2. — Types of lateral cover found in scaled quail loafing coverts during January-May 1980

Lateral cover	Number of coverts	Percent of coverts
Russian thistle	66	90.4
Grass	53	72.6
Yucca	20	27.4
Cholla cactus	13	17.8
Honey mesquite	7	9.6
Forbs	4	5.5
Fragrant sumac	4	5.5
Mountain-mahogany	1	1.4

Other Features

Although an area of bare soil was characteristic of the centers of all of the coverts, about 13% of them had an accumulation of litter. It is not known whether the absence of vegetation and exposure of soil in the center of the covert is a prerequisite for occupancy by scaled quail.

All coverts had 1 to 5 paths or openings through the lateral cover into the center area. The number of openings were distributed as follows:

Number of Openings	Frequency	Percent
1	2	2.7
2	32	43.8
3	33	45.2
4	4	5.5
5	2	2.7

A chi-square test indicated a significant departure ($P<0.01$) in the directional orientation of the openings from that expected if their orientations were uniformally distributed among the eight principal points of the compass. They tended to be oriented toward the north, northeast, and east (fig. 3). Fewer than the expected number were oriented toward the southeast, southwest, west, and northwest.

Significance to Survival

The overhead and lateral cover in coverts, especially the spiny cover of cholla, prevents access by avian predators, either through the canopy or from the side. Lateral cover may not protect scaled quail from mammalian predators, but more than one opening in the lateral cover would facilitate escape.

By blocking cold wind, the lateral cover helps to maintain thermal balance. However, protection is usually less on the northwest quadrant of the coverts, where most of the openings tended to be oriented (fig. 3). The openings seem to be oriented in the direction of less lateral cover. Probably because of the direction of prevailing winds, Russian thistle tended to accumulate in the other three quadrants, which, in turn, protected grass within this portion of the covert from grazing. The net effect was that the densest cover tended to be in the northwest, southwest, and southeast quadrants of the coverts.

By allowing sunlight to penetrate to ground level, the open crown of cholla and the absence of herbaceous cover in the center of the covert helps maintain thermal balance during cool weather. Also, sunlight and the absence of litter help dry the substrate quickly.

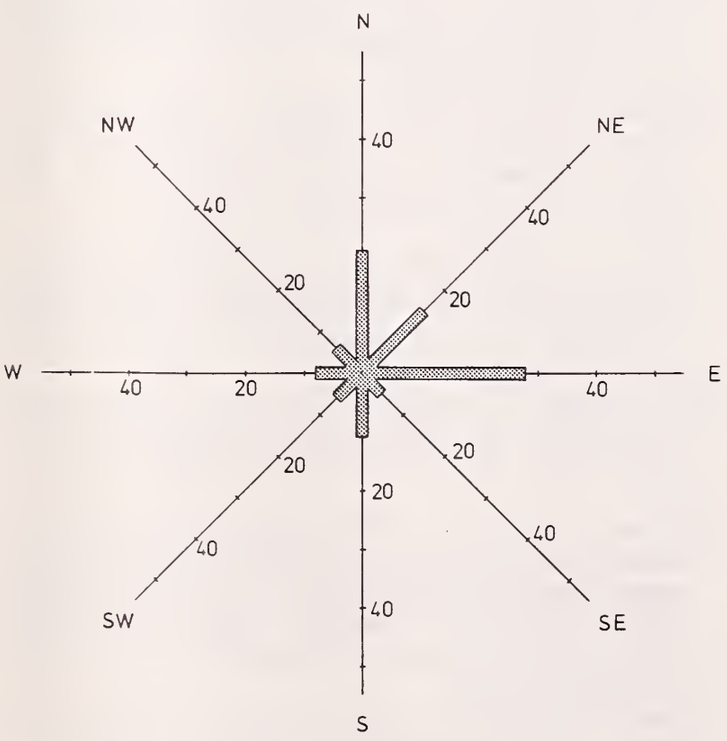

Figure 3. — Percentage distribution in the directional orientation of openings of scaled quail loafing coverts.

Conclusions

All coverts examined, regardless of species, had common structural features. Any species of overhead cover, which lends itself to formation of those features, may produce adequate resting coverts for scaled quail during the winter and early spring.

Protection of Existing Cover

Current research is assessing the number of coverts in covey winter home ranges. However, based on Schemnitz's (1961) estimate of winter home range size, one loafing covert per 52-70 acres (21-28 ha) would seem minimal for scaled quail to use an area.

When brush control is carried out, active coverts or potential coverts should be reserved to maintain quail use of the range. Active coverts can be identified during the winter by the accumulation of droppings. Individual plants and clumps of woody cover that could potentially serve as coverts will have branches sufficiently close to the ground to protect grass within the periphery of the crown from grazing. The low crown of fragrant sumac nearly always provides lateral cover.

Although no woody species should be discounted, cholla should be given strong consideration when protecting loafing coverts. Individual-plant treatment by grubbing, removal with a fork lift, or by spraying with herbicides are effective methods of cholla control (Scifres 1980). In this case, individual cholla coverts can be easily spared. Broadcast, aerial application of herbicides for brush control would require reserving motts or strips of cover rather than individual shrubs.

Burning of rangelands may not eliminate cholla over an extended period of time (Bunting et al. 1980). Also, quail used dead cholla (table 1). However, fire may cause necrosis of the lower branches, which could prevent formation of adequate lateral cover in the presence of grazing.[3]

Although scaled quail are more tolerant of grazing than other upland game birds (Snyder 1967), heavy livestock use would reduce lateral cover around coverts—the two most important components of which were Russian thistle and grass. Russian thistle rates as a fair livestock forage in early spring, before the spines harden (USDA Forest Service 1937). Excessive grazing or drought would preclude its development. Although, under normal circumstances, the overhead crown protects grass that forms the lateral cover, its density and height would be progressively reduced under continued heavy grazing. Cambell et al. (1973) noted that scaled quail do best on moderately-grazed ranges. Nevertheless, utilization of as little as 20% to 40% of the forage could be highly detrimental to grassland birds during drought periods (Brown 1978). The effects of a reduction in lateral cover by grazing could be partially mitigated by an interspersion of small fenced areas containing loafing coverts. However, this may not be economically practical. As an alternative, coverts could be protected with brush.

[3]*Personal conversation with Henry A. Wright, Department of Range and Wildlife Management, Texas Tech University, Lubbock, 1980.*

Cover Development

Scaled quail readily respond to placement of cover on ranges deficient in adequate coverts (Schemnitz 1961, Snyder 1967, Snyder 1970). Information from this study can be used as a guide for cover development.

Existing shrubs greater than 1.6 feet (0.5 m) in height and 2.6 feet (0.8 m) in diameter, under which the vegetation has been grazed short, may be made attractive by placing limbs around 75% of the periphery of the canopy. If present, Russian thistle will accumulate in the matrix of limbs. The brush should be of sufficient height and density to provide protection from grazing, and yet, permit growth of grass to 1 to 1.6 feet (0.3 to 0.5 m). Bare ground should be exposed in the center by removing herbaceous vegetation and any accumulation of litter. Although the herbaceous vegetation may eventually grow back, quail use of the covert should impede its development.

In some low-crowned shrubs, a dense, tall growth of herbaceous vegetation forms underneath the entire crown. This cover may be made attractive by removing the herbaceous vegetation from the center and from about 20% to 30% of the periphery. Herbaceous vegetation could be removed by hand hoeing in fall or by application of a grass-selective herbicide during the growing season. However, Rea and Pieper (n. d.) reported that spraying around the base with a grass-selective herbicide was detrimental to cholla.

Various tree and shrub species have been transplanted for scaled quail cover in New Mexico (Campbell 1952) and Colorado (Snyder 1967). Highest survival was attained with cholla. In Colorado, 100% survival was attained with specimens 0.5 to 1 foot (0.15 to 0.3 m) high. Cholla transplants up to 2.5 feet (0.76 m) tall with only remnants of their roots and planted into dry ground had excellent survival, although they received no moisture for a month after transplanting (Snyder 1967). Because branch growth of cholla 1.6 feet (0.5 m) tall is only about 2.4 to 3.1 inches (60 to 80 mm) per year (Frazer and Pieper 1972), planting small cholla in groups might produce attractive overhead cover in a shorter period of time.

Establishing plantings of overhead cover inside fenced livestock exclosures, as has been done in both New Mexico (Campbell 1952) and Colorado (Snyder 1967), would ensure development of essential lateral cover. However, dense herbaceous growth inside an exclosure can impede scaled quail access (Snyder 1970). An alternative would be to place limbs around the periphery of the plantings to protect grass from grazing.

Erection of artificial loafing coverts is a recommended management practice (Campbell 1952, Schemnitz 1961, Snyder 1967, Snyder 1970). Although explicit design is not essential (Snyder 1970), the structure of the cover should be similar to that of naturally occurring coverts (i.e., the design should provide for overhead cover, lateral cover around approximately 70% of the periphery, a central area free of vegetation, and two and five openings in the lateral cover to allow access and escape). Placing limbs or poles around a standing post or dead tree or over a wooden frame (Snyder 1970) could provide these features. The overhead cover should not be so dense as to prevent penetration of sunlight to the ground. Some loose brush around the perimeter would allow growth of lateral cover. Soil sterilents should be used in the center area of brush shelters to prevent growth of herbaceous vegetation (Snyder 1967).

Based on measurements made in this study, an artificial structure need not cover more than 10.8 to 14 square feet (1 to 1.3 m^2), although larger structures would not preclude quail use and may be needed where large numbers of birds are present, as at feeders. No measurements were made of the central, vegetation-free area of coverts. However, head room of about 1 foot (0.3 m) probably would be adequate for an artificial shelter.

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